7. Log Rules (mostly in base e) Must know!

$x = e^y$, $y = \ln x$ definition in base e

$\ln(1) = 0$

$\ln(e) = 1$

$\ln e^x = x$] inverse properties

$e^{\ln x} = x$]

$\ln x^n = n \cdot \ln x$

$\ln(A \cdot B) = \ln A + \ln B$

$\ln\left(\frac{A}{B}\right) = \ln A - \ln B$

if $\ln A = \ln B$ then $A = B$ converse also true.

if $e^A = e^B$ then $A = B$ converse also true.

$\log_a x = \frac{\log_b x}{\log_b(a)} = \frac{\ln x}{\ln(a)}$ change base a to b or e.

You must know these rules to solve problems with logarithms and exponentials.

$\ln(5e^{2x}) + \ln(2e^{3x}) + \overbrace{\ln(1)}^{0} \cdot (3x^5 + 4x^2 + 999) = \ln(100)$

$\ln(5e^{2x}) + \ln(2e^{3x}) = \ln(100)$

$\ln(5 \cdot e^{2x} \cdot 2 \cdot e^{3x}) = \ln(100)$

$\ln(5 \cdot 2 \cdot e^{2x} \cdot e^{3x}) = \ln(100)$

$\ln(10 \cdot e^{(2x+3x)}) = \ln(100)$

$\ln(10 \cdot e^{5x}) = \ln 100$

$10 \cdot e^{5x} = 100$

$\ln e^{5x} = \ln 10$

$5x = \ln 10$

$x = \frac{\ln(10)}{5}$ exact

$x \approx 0.4605$ to 4 decimal places